

REMARKS

By this Amendment, claims 1, 3 and 5 are amended, claims 2 and 4 have been canceled, and claims 8-16 have been added. Claims 1, 3, 5 and 8-16 will be pending in the application upon entry of this Amendment.

Request for Continued Examination and Withdrawal of Appeal

A final Office Action in this application was mailed. June 23, 2005. Applicants filed a reply to the final Office Action on September 22, 2005. The Examiner mailed an Advisory Action on October 18, 2005 indicating that the reply was not considered to place the application in condition for allowance. Applicants filed a Notice of Appeal on October 24, 2005.

Applicants hereby request withdrawal of the Appeal and reopening of prosecution pursuant to Rule 114(d).

Claim Rejections Under 35 U.S.C. § 102

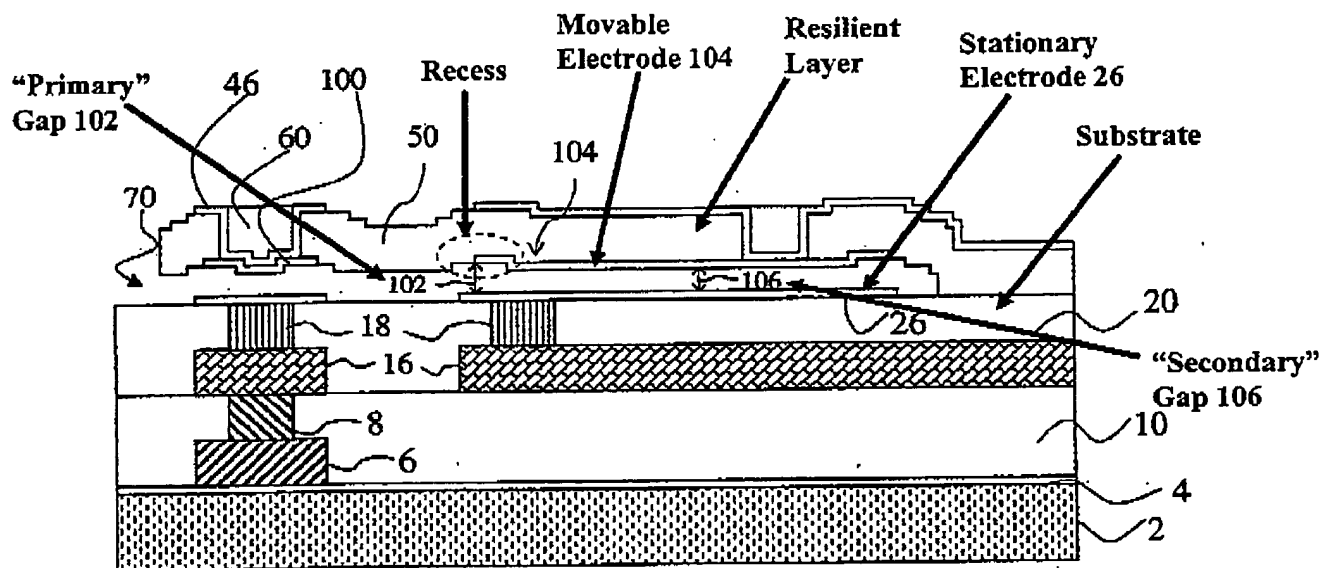
Claims 1-5 stand finally rejected under 35 U.S.C. 102(e) as allegedly being anticipated by U.S. Patent No. 6,746,891 to Cunningham et al. (Cunningham). Claims 2 and 4 have been canceled and independent claims 1, 3 and 5 have been amended to include many of the limitations of previous claims 2 and 4, as well as additional limitations. For reasons set forth below, Applicants respectfully traverse this rejection as to the pending claims.

Summary of Claimed Subject Matter

The present invention as set forth in the amended claims relates to an electrostatically actuated structure such as a micro-electro-mechanical system (MEMS) switch. More particularly, the claimed invention relates to a unique "cantilever beam" design for such a structure that provides lower actuation voltage, higher reliability, and reduced likelihood of problems such as stiction and beam deformation.

According to one aspect, the claimed structure includes a substrate having a stationary electrode, and a resilient layer (i.e. beam) having a movable electrode. Notably, a surface of the beam has a recessed portion formed therein that is displaced further away from the substrate than other portions. The movable electrode has portions in the recess and other portions outside the

recess. One example structure according to the principles of the claimed invention is shown in Fig. 20, reproduced and annotated below, and also described at page 9, lines 10-21 for example.



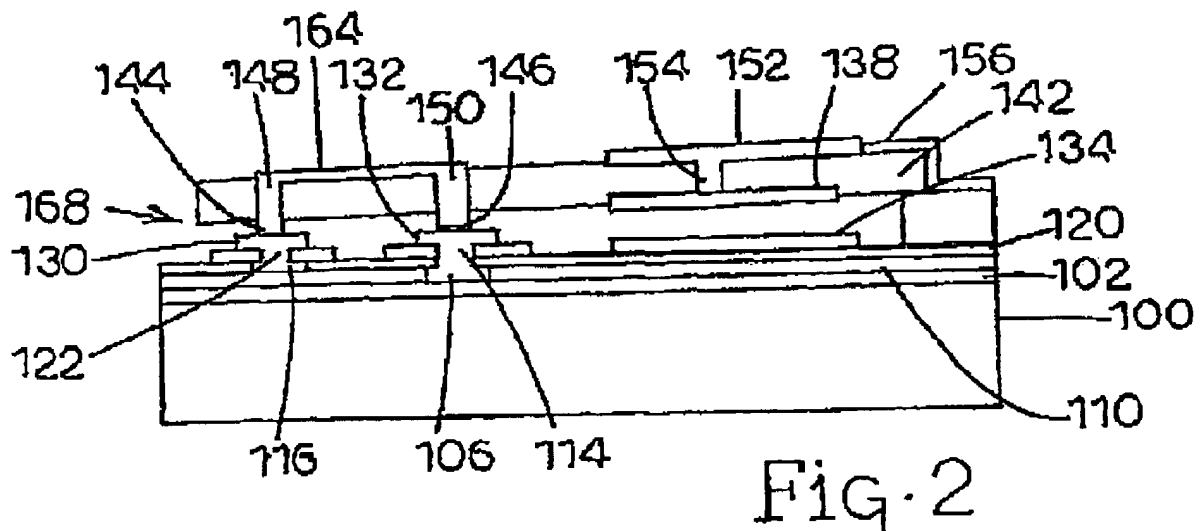
According to a further aspect of the invention, and as graphically depicted above, the recessed structure allows for the movable electrode to have different portions that are separated from the substrate by different distances, for example the "primary" and "secondary" gaps 102 and 106, respectively. As further set forth in the specification, the respective sizes of the portions can be changed in order to vary the actuation, sensing, damping, and other properties of the switch. (see page 9, lines 18-21, for example).

Another advantage of this recessed movable electrode structure is that, during actuation of the stationary and movable electrodes, a movable contact (e.g. element 100 in Fig. 19) can make contact with a stationary contact (the area below element 100 in Fig. 19) without the electrodes shorting, and with lower actuation voltages. (see the present specification at page 9, line 22 to page 10, line 17, for example).

Amended Independent Claims 1, 3 and 5 Patentably Define Over Cunningham

In accordance with these and other aspects of the invention, and as set forth in amended independent claims 1, 3 and 5 an actuator / switch / method of implementing an actuation function, respectively, includes a resilient structural layer (e.g. beam shown in FIG. 19) including a surface having a recessed portion (e.g. see recess circled in FIG. 19) and a proximal portion (e.g. portions outside the recess). The proximal portion is separated from the substrate by a smaller distance than the recessed portion. A movable electrode has first and second portions in the recess portion and proximal portion of the surface, respectively (e.g. see electrode 104 in FIG. 19). Accordingly, the movable electrode (e.g. electrode 104 in FIG. 19) has first and second portions separated from the substrate by different distances (e.g. compare gaps 102 and 106 in FIG. 19, see also page 9, lines 10-21).

This subject matter includes limitations similar to those in previous claims 2 and 4. In rejecting claims 2 and 4, the Examiner relied on Figure 2 of Cunningham. For convenience, Figure 2 of Cunningham is reproduced below.



As can be clearly seen, Cunningham fails to meet the explicit limitations of amended claims 1, 3 and 5. Figure 2 of Cunningham merely shows a beam MEMS device during actuation. Even if this operational drawing could be used to support a rejection, this Figure still

fails to anticipate the structure of the claimed recessed movable electrode or the advantages derived therefrom.

For example, Cunningham does not disclose or suggest a movable electrode that has first and second portions in separate and respective recess and proximal portions formed in a resilient layer surface, as explicitly required by amended independent claims 1, 3 and 5.

Cunningham merely provides a movable electrode 138 that is separated by a uniform gap from a stationary electrode 134 at rest (Figure 1v). Although during actuation, portions of the surface deflect toward the substrate more than other portions, nowhere does Cunningham disclose or suggest that the surface has different portions formed therein, much less that the electrode 138 can have different portions in the separate and different layer portions so as to be separated by different gaps from the stationary electrode 134.

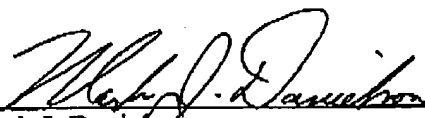
Therefore, for at least these additional reasons, Applicants respectfully request withdrawal of the rejections of amended independent claims 1, 3 and 5.

Conclusion

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition of allowance and a Notice to that effect is earnestly solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,
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Date: December 27, 2005


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